Complete Summary

GUIDELINE TITLE

Evaluation of acute right lower quadrant pain.

BIBLIOGRAPHIC SOURCE(S)

Bree RL, Blackmore CC, Foley WD, Gay SB, Glick SN, Heiken JP, Huprich JE, Levine MS, Ros PR, Rosen MP, Shuman WP, Greene FL, Rockey DC, Expert Panel on Gastrointestinal Imaging. Evaluation of acute right lower quadrant pain. [online publication]. Reston (VA): American College of Radiology (ACR); 2005. 7 p. [43 references]

GUIDELINE STATUS

This is the current release of the guideline.

This guideline updates a previous version: Ralls PW, Balfe DM, Bree RL, DiSantis DJ, Glick SN, Levine MS, Megibow AJ, Saini S, Shuman WP, Greene FL, Laine LA, Lillemoe K. Evaluation of acute right lower quadrant pain. American College of Radiology. ACR Appropriateness Criteria. Radiology 2000 Jun;215(Suppl):159-66.

The appropriateness criteria are reviewed annually and updated by the panels as needed, depending on introduction of new and highly significant scientific evidence.

COMPLETE SUMMARY CONTENT

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SCOPE

DISEASE/CONDITION(S)

Acute right lower quadrant pain

GUIDELINE CATEGORY

Diagnosis

CLINICAL SPECIALTY

Emergency Medicine
Family Practice
Internal Medicine
Nuclear Medicine
Pediatrics
Radiology
Surgery

INTENDED USERS

Health Plans
Hospitals
Managed Care Organizations
Physicians
Utilization Management

GUIDELINE OBJECTIVE(S)

To evaluate the appropriateness of initial radiologic examinations for patients with acute right lower quadrant pain

TARGET POPULATION

Patients with acute right lower quadrant pain

INTERVENTIONS AND PRACTICES CONSIDERED

1. X-ray
    - Chest
    - Anteroposterior and upright abdomen
    - Barium enema, air contrast
    - Barium enema, single contrast
    - Small bowel series, with barium
    - Small bowel, enteroclysis
2. Ultrasound (US)
    - Right lower quadrant (RLQ), graded compression
    - Pelvic/endovaginal
3. Computed tomography (CT)
    - Without contrast
    - With IV contrast
4. Nuclear medicine
    - White blood cell (WBC) scan
    - Gallium scan
5. Magnetic resonance imaging (MRI)
    - Abdomen with or without enhancement

MAJOR OUTCOMES CONSIDERED

Utility of radiologic examinations in differential diagnosis

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

The guideline developer performed literature searches of peer-reviewed medical journals, and the major applicable articles were identified and collected.

NUMBER OF SOURCE DOCUMENTS

The total number of source documents identified as the result of the literature search is not known.

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Not Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Not stated

METHODS USED TO ANALYZE THE EVIDENCE

Systematic Review with Evidence Tables

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

One or two topic leaders within a panel assume the responsibility of developing an evidence table for each clinical condition, based on analysis of the current literature. These tables serve as a basis for developing a narrative specific to each clinical condition.

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus (Delphi)

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

Since data available from existing scientific studies are usually insufficient for meta-analysis, broad-based consensus techniques are needed to reach agreement

in the formulation of the appropriateness criteria. The American College of Radiology (ACR) Appropriateness Criteria panels use a modified Delphi technique to arrive at consensus. Serial surveys are conducted by distributing questionnaires to consolidate expert opinions within each panel. These questionnaires are distributed to the participants along with the evidence table and narrative as developed by the topic leader(s). Questionnaires are completed by the participants in their own professional setting without influence of the other members. Voting is conducted using a scoring system from 1 to 9, indicating the least to the most appropriate imaging examination or therapeutic procedure. The survey results are collected, tabulated in anonymous fashion, and redistributed after each round. A maximum of three rounds is conducted and opinions are unified to the highest degree possible. Eighty percent agreement is considered a consensus. This modified Delphi technique enables individual, unbiased expression, is economical, easy to understand, and relatively simple to conduct.

If consensus cannot be reached by the Delphi technique, the panel is convened and group consensus techniques are utilized. The strengths and weaknesses of each test or procedure are discussed and consensus reached whenever possible. If "No consensus" appears in the rating column, reasons for this decision are added to the comment sections.

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Not applicable

COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

METHOD OF GUIDELINE VALIDATION

Internal Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

Criteria developed by the Expert Panels are reviewed by the American College of Radiology (ACR) Committee on Appropriateness Criteria.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

ACR Appropriateness Criteria™

Clinical Condition: Acute Right Lower Quadrant Pain

Variant 1: Fever, leukocytosis, and classic presentation clinically for appendicitis in adults.

Radiologic Exam Procedure	Appropriateness Rating	Comments
CT, abdomen, with IV contrast	8	
CT, abdomen, with contrast	6	
US, abdomen RLQ, graded compression	6	
X-ray, abdomen, AP and upright	5	
X-ray, chest	5	
US, pelvis and endovaginal	5	
X-ray, barium enema, air contrast	4	
X-ray, barium enema, single contrast	4	
MRI, abdomen, with or without contrast	4	
X-ray, small-bowel series, with barium	3	
NUC, Gallium scan	3	
NUC, WBC scan	3	
X-ray, small bowel, enteroclysis	2	
Appropriateness Criteria Scale 1 2 3 4 5 6 7 8 9 1 = Least appropriate 9 = Most appropriate		

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 2: Fever, leukocytosis; possible appendicitis, atypical presentation, adults and adolescents.

Radiologic Exam Procedure	Appropriateness Rating	Comments
CT, abdomen, with IV	8	

Radiologic Exam Procedure	Appropriateness Rating	Comments
contrast		
X-ray, abdomen, AP and upright	6	
CT, abdomen, with contrast	6	
US, abdomen RLQ, graded compression	6	
US, pelvis and endovaginal	6	
X-ray, barium enema, air contrast	5	
X-ray, barium enema, single contrast	5	
X-ray, chest	5	
MRI, abdomen, with or without contrast	5	
X-ray, small-bowel series, with barium	4	
NUC, Gallium scan	3	
NUC, WBC scan	3	
X-ray, small bowel, enteroclysis	2	
Appropriateness Criteria Scale 1 2 3 4 5 6 7 8 9 1 = Least appropriate 9 = Most appropriate		

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 3: Fever, leukocytosis, pregnant woman.

Radiologic Exam Procedure	Appropriateness Rating	Comments
US, abdomen, RLQ, graded compression	8	
MRI, abdomen, with or	7	

Radiologic Exam Procedure	Appropriateness Rating	Comments
without contrast		
CT, abdomen, with IV contrast	6	
US, pelvis and endovaginal	6	
CT, abdomen, without contrast	5	
X-ray, chest	4	
X-ray, abdomen, AP and upright	2	
X-ray, barium enema, air contrast	2	
X-ray, barium enema, single contrast	2	
X-ray, small-bowel series, with barium	2	
X-ray, small bowel, enteroclysis	2	
NUC, Gallium scan	2	
NUC, WBC scan	2	
Appropriateness Criteria Scale 1 2 3 4 5 6 7 8 9 1 = Least appropriate 9 = Most appropriate		

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 4: Fever, leukocytosis, possible appendicitis, atypical presentation in children (less than 14 years of age).

Radiologic Exam Procedure	Appropriateness Rating	Comments
US, abdomen RLQ, graded compression	8	
CT, abdomen, with IV contrast	7	May be useful following negative US.

Radiologic Exam Procedure	Appropriateness Rating	Comments
X-ray, abdomen, AP and upright	6	
X-ray, chest	5	
CT, abdomen, without contrast	5	
US, pelvis and endovaginal	5	
MRI, abdomen, with or without contrast	5	
X-ray, barium enema, air contrast	3	
X-ray, barium enema, single contrast	3	
X-ray, small-bowel series, with barium	3	
X-ray, small bowel, enteroclysis	2	
NUC, Gallium scan	2	
NUC, WBC scan	2	
Appropriateness Criteria Scale 1 2 3 4 5 6 7 8 9 1 = Least appropriate 9 = Most appropriate		

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Few comparative imaging studies evaluating right lower quadrant pain are available. Most imaging reports center on disease processes, such as appendicitis. Because appendicitis is the most common cause of right lower quadrant pain, the focus of this narrative is on appendicitis and the accuracy of imaging procedures in diagnosing appendicitis, although consideration of other diseases is, of course, included.

Acute appendicitis is the most common acute abdominal disorder that requires surgery. In most patients with acute appendicitis, imaging may not be necessary, because the clinical presentation is sufficiently diagnostic to allow surgery. To date, however, no prediction rules for identifying subjects with appendicitis have been validated. In the published studies for imaging in appendicitis, the selection criteria for imaging are not often stated, but in most investigations, subjects with definitive clinical exam findings of appendicitis undergo operation without

imaging. In the reported imaging studies, an average of 45 to 50% of imaged subjects had appendicitis, and 36% had nonspecific abdominal pain. Data on the overall effect of imaging on surgical treatment of appendicitis and patient outcome remain contradictory.

Plain film diagnosis is of limited value evaluating acute appendicitis, except in occasional circumstances when an appendicolith or other ancillary findings are identified. Although barium enema has been used historically to diagnose appendicitis, it depends on the negative finding of nonvisualization of the appendix and may be quite uncomfortable in patients with acute appendicitis. Nonetheless, barium small-bowel follow-through or barium enema may be useful for other causes of right lower quadrant pain, including suspected small bowel obstruction, infectious ileitis, and inflammatory bowel disease. Finally, use of MRI for appendicitis has been reported in a few small case series, including in pregnant women.

CT is the most accurate study for evaluating patients without a clear clinical diagnosis of acute appendicitis. In a meta-analysis of prospective studies of the accuracy of CT and ultrasonography in adolescents and adults, CT demonstrated superior sensitivity (0.94, 95% CI: 0.91 to 0.95) and specificity (0.95, 95% CI: 0.93 to 0.96) versus US (sensitivity 0.86, 95% CI: 0.83 to 0.88; specificity 0.81, 95% CI: 0.78 to 0.84). This analysis was based on 12 studies of CT and 14 studies of US identified through December 2003, and included four studies that directly compared both modalities. The results of investigations of CT showed consistent results across all studies and institutions, while US investigations demonstrated heterogeneity, suggesting greater dependence on operator skill. Another controversy is whether or not to use intravenous contrast in the CT evaluation of appendicitis. High accuracy has been reported for both techniques, and direct comparisons are lacking. However, the majority of the available evidence is on CT with intravenous contrast. Institutional experience may be the best determinant appropriateness of intravenous contrast. Both CT and US may be effective in detecting causes of pain unrelated to appendicitis. CT has been reported to show a non-appendicitis cause of abdominal pain in 20% of subjects, versus 15% for US. The range of diseases studied includes inflammatory bowel disease, infectious bowel disease, small bowel obstruction, acute gynecological conditions and others.

CT appears superior to sonography in evaluating patients with periappendiceal abscess, especially when the abscesses become large. CT can be used to choose among different therapeutic options, including antibiotic treatment (with small abscesses), percutaneous drainage (with one to three well-defined medium-sized abscesses), and surgery (with extensive abnormality not amenable to percutaneous drainage).

CT and US have been less well evaluated in children than in adults. Many large prospective studies include subjects of all ages, despite the potential differences in imaging accuracy between children and adults due to smaller body size and less body fat in children. This makes it difficult to determine the accuracy of imaging in different subgroups. Further, the increased radiosensitivity of children makes the use of ionizing radiation of more concern for them. A systematic literature review through July 2004 revealed eight prospective evaluations of US for appendicitis in children. The pooled sensitivity of graded compression US was 91% (95% CI: 89

to 93%), and the specificity was 97% (95% CI: 95 to 99%). Only a single prospective study of CT in children was identified, reporting a sensitivity of 95%, and specificity of 98%. There is also a small literature on use of US as an initial imaging study, followed by CT for equivocal cases. Such protocols demonstrate sensitivity of 95% (95% CI: 83 to 100%), and specificity 93% (95% CI: 87 to 97%). These results suggest that although CT is more accurate, US may also be appropriate in experienced hands, particularly if equivocal results are followed up by CT.

Nuclear medicine imaging with WBC scans has also been reported for evaluating right lower quadrant pain.

Evaluation of the accuracy of imaging in pregnant women has received little attention in the literature. In general, ionizing radiation from CT should be avoided during pregnancy, and US is clearly a safer imaging option. However, with the absence of evidence, no specific recommendation can be made.

Abbreviations

- AP, anteroposterior
- CT, computed tomography
- IV, intravenous
- MRI, magnetic resonance imaging
- NUC, nuclear medicine
- RLQ, right low quadrant
- US, ultrasound
- WBC, white blood cell

CLINICAL ALGORITHM(S)

Algorithms were not developed from criteria guidelines.

EVIDENCE SUPPORTING THE RECOMMENDATIONS

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The recommendations are based on analysis of the current literature and expert panel consensus.

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

Selection of appropriate radiologic imaging procedures for evaluation of patients with acute right lower quadrant pain.

POTENTIAL HARMS

- Barium enema may be quite uncomfortable in patients with acute appendicitis.

- In general, ionizing radiation from computed tomography (CT) should be avoided during pregnancy, and ultrasound (US) is clearly a safer imaging option.

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

An American College of Radiology (ACR) Committee on Appropriateness Criteria and its expert panels have developed criteria for determining appropriate imaging examinations for diagnosis and treatment of specified medical condition(s). These criteria are intended to guide radiologists, radiation oncologists, and referring physicians in making decisions regarding radiologic imaging and treatment. Generally, the complexity and severity of a patient's clinical condition should dictate the selection of appropriate imaging procedures or treatments. Only those exams generally used for evaluation of the patient's condition are ranked. Other imaging studies necessary to evaluate other co-existent diseases or other medical consequences of this condition are not considered in this document. The availability of equipment or personnel may influence the selection of appropriate imaging procedures or treatments. Imaging techniques classified as investigational by the U.S. Food and Drug Administration (FDA) have not been considered in developing these criteria; however, study of new equipment and applications should be encouraged. The ultimate decision regarding the appropriateness of any specific radiologic examination or treatment must be made by the referring physician and radiologist in light of all the circumstances presented in an individual examination.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

IMPLEMENTATION TOOLS

Personal Digital Assistant (PDA) Downloads

For information about availability, see the "Availability of Companion Documents" and "Patient Resources" fields below.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Getting Better

IOM DOMAIN

Effectiveness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

Bree RL, Blackmore CC, Foley WD, Gay SB, Glick SN, Heiken JP, Huprich JE, Levine MS, Ros PR, Rosen MP, Shuman WP, Greene FL, Rockey DC, Expert Panel on Gastrointestinal Imaging. Evaluation of acute right lower quadrant pain. [online publication]. Reston (VA): American College of Radiology (ACR); 2005. 7 p. [43 references]

ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

1996 (revised 2005)

GUIDELINE DEVELOPER(S)

American College of Radiology - Medical Specialty Society

SOURCE(S) OF FUNDING

The American College of Radiology (ACR) provided the funding and the resources for these ACR Appropriateness Criteria.™

GUIDELINE COMMITTEE

Committee on Appropriateness Criteria, Expert Panel on Gastrointestinal Imaging.

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

Panel Members: Robert L. Bree, MD, MHSA; C. Craige Blackmore, MD, MPH; W. Dennis Foley, MD; Spencer B. Gay, MD; Seth N. Glick, MD; Jay P. Heiken, MD; James E. Huprich, MD; Marc S. Levine, MD; Pablo R. Ros, MD, MPH; Max Paul Rosen, MD, MPH; William P. Shuman, MD; Frederick L. Greene, MD; Don C. Rockey, MD

FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

GUIDELINE STATUS

This is the current release of the guideline.

This guideline updates a previous version: Ralls PW, Balfe DM, Bree RL, DiSantis DJ, Glick SN, Levine MS, Megibow AJ, Saini S, Shuman WP, Greene FL, Laine LA,

Lillemoe K. Evaluation of acute right lower quadrant pain. American College of Radiology. ACR Appropriateness Criteria. Radiology 2000 Jun;215(Suppl):159-66.

The appropriateness criteria are reviewed annually and updated by the panels as needed, depending on introduction of new and highly significant scientific evidence.

GUIDELINE AVAILABILITY

Electronic copies: Available in Portable Document Format (PDF) from the American College of Radiology (ACR) Web site.

Appropriateness Criteria Anytime, Anywhere™ (PDA application). Electronic copies: Available from the (ACR) Web site.

Print copies: Available from American College of Radiology, 1891 Preston White Drive, Reston, VA 20191. Telephone: (703) 648-8900.

AVAILABILITY OF COMPANION DOCUMENTS

The following is available:

- ACR Appropriateness Criteria.™ Background and development. Reston (VA): American College of Radiology; 2 p. Electronic copies: Available in Portable Document Format (PDF) from the American College of Radiology (ACR) Web site.

PATIENT RESOURCES

None available

NGC STATUS

This summary was completed by ECRI on March 19, 2001. The information was verified by the guideline developer on March 29, 2001. This summary was updated by ECRI on March 24, 2006.

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